AMENDMENT
(Amendment under Article 11)

(PCT/05.2.04/Received)

To: Examiner of the Patent Office

1. Identification of the International Application
PCT/JP03/04610

2. Applicant

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3. Agent

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4.: Item to be Amended: Description and Claims

5. Subject Matter of Amendment

(1) In Description as filed, "This common electrode 32 is divided ..." on page 13, lines 1 to 3 is amended to read:
"The display area of the liquid crystal display device 15 is divided into the pictogram display area 33 and the moving image display area 34".

(2) In Description as filed, "The source terminal of the first pictogram TFT 51 is connected to the signal line 19." on page 42, lines 15 to 16 is amended to read:
"Any one of the source terminal and the drain terminal of the first pictogram TFT 51 is connected to the signal line 19.".

(3) In Description as filed, "The drain terminal of the first pictogram TFT 51 is connected to the first pictogram electrode 23." on page 42, lines 19 to 21 is amended to read:
"The other terminal of the first pictogram TFT 51 is connected to the first pictogram electrode 23.".

(4) In Description as filed, "The source terminal of the second pictogram TFT 52 is connected to the signal line 20." on page 43, lines 3 to 4 is amended to read:
"Any one of the source terminal and the drain terminal of the second pictogram TFT 52 is connected to the signal line 20.".

(5) In Description as filed, "The drain terminal of the second pictogram TFT 52 is connected to the second pictogram electrode 24." on page 43, lines 9 to 11 is amended to read:
"The other terminal of the second pictogram TFT 52 is connected to the second pictogram electrode 24.".

(6) In Claims, claims 1, 6, and 12 are amended.

6. List of Attached Documents

(1) Replacement sheet of pages 13, 42 and 43.

(2) Replacement sheet of pages 86 to90.

WRITTEN REPLY

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4. Date of Notification: 09.12.03

5. Contents of reply

(1) In the PCT written opinion dated December 9, 2003 (dispatch date), it is suggested, based on a first document: JP 2000-338513 A, that the invention recited in claims 1 to 5 in Claims of the present application lacks novelty and inventiveness. It is also suggested, based on a second document: JP 2001-255850 A, that the invention recited in claims 6 to 8 in Claims of the present application lacks novelty and inventive steps.

(2) The Applicant has amended Description and Claims by a written amendment submitted simultaneously with this written reply. That is, claim 1 in Claims now reads:

[1. A liquid crystal display device capable of displaying a moving image display area for displaying moving images and a pictogram display area, wherein the moving image display area is formed by arranging display electrodes in a matrix, the display electrode being driven by thin-film transistor elements, and the pictogram display area is formed by disposing a segment electrode in a shape of a predetermined pictogram, wherein

a common electrode is provided on an entire position that is opposed to both the moving image display area and the pictogram display area,

a scan-side integrated circuit for driving scan lines is provided so as to be connected to the scan lines connected to the thin-film transistors arranged in a row direction in the moving image display area,

a data-side integrated circuit for driving data lines is provided so as to be connected to the data lines connected to the thin-film transistors arranged in a column direction in the moving image display area, and the data-side integrated circuit is provided with a larger number of output terminals than the data lines, and

the segment electrode is connected to an output terminal, which is different from an output terminal to which data line for moving images is connected, of the

data-side integrated circuit, and a difference between a potential of the common electrode and a potential of an output signal from the data-side integrated circuit, which is generated due to driving based on polarity of the common electrode, is used to display the pictogram in the pictogram display.]

This amendment has been made based on page 7, line 27 to page 8, line 1 in Description as filed, "Also, on the entire surface of the common substrate 35, a common electrode 32 made of a transparent electrode film is formed." and a description regarding Fig. 2 on page 9, lines 9-15 in Description as filed, "Therefore, in the present embodiment, the data-side integrated circuit 26 requires the moving image data lines 6 and fixed image signal lines 19, 20, and 30.

The signal lines 19 and 20 (and also the signal line 30 when the background electrode 25 is present) are lines other than the moving image data lines 6 provided to the data-side integrated circuit 26, and are connected to electrodes made of chromium (Cr) additionally provided to the data-side integrated circuit 26."

Also, claim 6 in Claims now reads:

[6. A liquid crystal display device capable of displaying a moving image display area for displaying moving images and a pictogram display area, wherein the moving image display area is formed by arranging display electrodes in a matrix, the display electrodes being driven by moving-image thin-film transistor elements, and the pictogram display area is formed by disposing a pictogram electrode in a shape of a predetermined pictogram, the pictogram electrode being driven by a pictogram thin-film transistor element, wherein

a common electrode is provided on an entire position that is opposed to the moving image display area and the pictogram display area,

a scan-side integrated circuit for driving scan lines is provided so as to be connected to the scan lines connected to the moving-image thin-film transistors arranged in a row direction in the moving image display area,

a data-side integrated circuit for driving data lines is provided so as to be connected to the data lines connected to the moving-image thin-film transistors arranged in a column direction in the moving image display area, and to the data-side integrated circuit output terminals are provided in a number that is greater than the number of data lines, and

either one of a source terminal or a drain terminal of the pictogram thin-film transistor is connected to, among a plurality of output terminals of the data-side integrated circuit, an output terminal that is different from output terminals to which the data lines connected to the moving-image thin-film transistors are connected, and other terminal of the pictogram thin-film transistor is connected to the pictogram electrode, a gate terminal of the pictogram thin-film transistor is connected to an output terminal of the scan-side integrated circuit, and a difference between a potential of the common electrode and a potential of the drain terminal of the pictogram thin-film transistor is used to display the pictogram in the pictogram display area.]

This amendment has been made based on Fig. 10 and a description of Fig. 10 recited on page 27, line 3 to page 28, line 5 in Description as filed, "Fig. 10 is ...The moving image display area 34.". Furthermore, "the segment electrode is connected to an extra output terminal of the data-side integrated circuit" is deleted to clarify the relation between the data lines connected to the moving image display area and the data lines connected to the pictogram display area.

Furthermore, claim 12 in Claims now reads:

[12. The liquid crystal display device according to claim 6, wherein

the pictogram display area is provided with the plurality of the pictogram electrodes and the plurality of the pictogram thin-film transistors, and any one of source terminals and drain terminals, which are connected to the pictogram electrodes, of the plurality of the pictogram thin-film transistors, are connected to a same output terminal of the data-side integrated circuit, and other terminals of the plurality of pictogram

thin-film transistors are connected to different output terminals of the scan-side integrated circuit.]

This amendment has been made to clarify the relation between the terms recited in Claim 6 in Claims and the terms recited in Claim 12 in Claims.

Also, "This common electrode 32" on page 8, line 1 in Description as filed has been amended to "this liquid crystal display device 15" to correct an error. This is obvious from Fig. 2 in which the moving display area 34 and the pictogram display area 33 are separately provided.

Furthermore, "The source terminal of the (first) pictogram TFT 51" page 27, line 13 and page 27, line 23 in Description as filed has been amended to "Either one of the source terminal and the drain terminal of the (first) pictogram TFT 51" based on the contents of claim 6 in Claims.

Still further, "The drain terminal of the (first) pictogram TFT 51 is connected..." on page 27, line 17 and page 28, line 2 has been amended to "The other terminal of the (first) pictogram TFT 51 is connected ..." also based on the contents of claim 6 in Claims.

(3) Regarding the first document

The first document describes a liquid crystal display element including an icon display unit 20 (corresponding to the pictogram display area in the present application) and a data display unit 3 (corresponding to the moving image display area in the present application). Also, the first document exemplarily discloses a simple matrix structure of the data display unit 3. As another example, an exemplary structure of an active-type liquid crystal display element is described in which active elements, such as TFTs, are each disposed on a pixel electrode on one glass substrate, while a common electrode is provided to the other glass substrate. Furthermore, the liquid crystal display element is provided with a wire connection 7 provided to the data display unit 3 and a wire connection 7a connected to a graphic display electrode 6 in the icon display unit 20,

both wire connections extending to a connecting terminal by separate wirings.

As for the first document does not describe the structure of a specific "common electrode" such that "a common electrode is provided on an entire surface opposed to the moving image display area and the pictogram display area" recited in the invention according to claim 1 in Claims of the present application as amended.

Also, the first document does not describe "the segment electrode is connected to an output terminal that is different from output terminals to which the moving image data lines of the data-side integrated circuit are connected" recited in the invention according to claim 1 in Claims of the present application as amended. In the liquid crystal display device including the moving image display area and the pictogram display area, it is normally general for the person skilled in the art that the icon display unit 20, which is in a different display mode, is driven by a segment driver, while the data display unit 3 is driven by the data-side integrated circuit.

With the differences described above, in the present invention according to claim 1 in Claims of the present application as amended, the data-side driving circuit connected to the pictogram display area and the moving image display area can be commonly used without requiring a segment driver. Thus, a space-saving, low-cost liquid crystal display device can be configured, which is a unique feature of the present invention. Such an unique effect is not described or suggested in the first document.

Also, as a specific method of driving the liquid crystal display device, "an output signal from the data-side integrated circuit to the segment electrode is generated so that an output potential is varied for each predetermined period" is described in the invention according to claim 2 in Claims of the present application. This makes it possible to actually drive the liquid crystal display device of the present application.

Furthermore, by adopting the structure of the invention according to claim 1 in Claims of the present application as amended, the liquid crystal display device can be driven so that "the output potential varied for each predetermined period is made within

a voltage range of the potential of the common electrode, thereby suppressing a direct-current component caused by a difference between the potential of the data output signal and the potential of the common electrode.", which is recited in the invention according to claim 3 in Claims of the present application as amended. This specific driving method with the direct-current component being suppressed is not described or suggested in the first document, either. Therefore, we believe that novelty and inventive step have been ensured for the invention of claim 1 in Claims.

Claims 4 and 5 in Claims are dependent on claims 2 and 3, respectively, which have novelty and inventive step, in Claims. Therefore, novelty and inventive step have been assured also for claims 4 and 5.

(4) Regarding the second document

The second document describes a liquid crystal display device including a first display unit for a fixed pictogram (corresponding to the pictogram display area of the present application) and a second display unit for active matrix display (corresponding to the moving image display area of the present application). The liquid crystal display device is structured such that, on the first display unit, pixel electrodes are formed so as to allow "always-required information, such as the remaining amount of battery and incoming information" to be displayed. An intersecting part of a scan line and a signal line is provided with a switching element, which can drive the relevant pixel electrode.

The second document discloses a mode in which a counter electrode driving circuit 19 is connected to the counter electrodes 18 of both of the first display area and the second display area. However, the second document does not describe "a common electrode is provided on an entire surface opposed to the moving image display area and the pictogram display area" which is recited in the invention according to claim 6 in Claims of the present application as amended.

Also, a mode is described in paragraphs 14 to 17 and Figs. 1 to 3 of the second document, in which the same signal lines S1 to S3 derived from a signal line driving

circuit 17 are connected to the pixel electrodes of the first display area and also the pixels of the second display area. Also, another mode is recited in paragraphs 23 to 26 and Fig. 8, in which signal lines S11 to S13 derived from a signal line driving circuit 17a each have connected thereto the pixel electrodes of the first display area and signal lines S21 to S23 derived from a signal line driving circuit 17b each have connected thereto the pixels of the second display area.

On the other hand, in the invention according to claim 6 in Claims of the present application as amended, "either one of a source terminal or a drain terminal of the pictogram thin-film transistor is connected to, among a plurality of output terminals of the data-side integrated circuit, an output terminal that is different from output terminals to which the data lines connected to the moving-image thin-film transistors are connected." Therefore, among a plurality of output terminals derived from one data-side integrated circuit, the pictogram electrode in the pictogram display area and the pixels of the moving image display area are connected different output terminals. A difference from the second document resides at this point.

Owing to this difference, the invention according to claim 6 in Claims of the present application has a unique feature in that a space-saving, low-cost liquid crystal display device can be configured. Such an unique effect is not described or suggested in the second document. Therefore, we believe that, with respect to the second document, novelty and inventive step have been ensured for the invention of claim 6 in Claims as amended.

Claims 7, 8, 11, and 12 in Claims are each dependent on claim 6, which has novelty and inventive step, in Claims. Therefore, novelty and inventive step have been assured also for claims 7, 8, 11, and 12.

(5) Description corresponding to "extra output terminal"

Amendment has been made to claim 1 in Claims of the present application as in the attached written amendment. By amending "the segment electrode is connected

to an extra output terminal of the data-side integrated circuit" before amendment to "the segment electrode is connected to an output terminal that is different from output terminals to which moving image data lines of the data-side integrated circuit are connected", the relation with "a larger number of output terminals than the data lines" recited in the preceding paragraph in claim 1 in Claims as amended can be clarified, thereby making consistent with the contents of Fig. 2.

Also, claim 6 in Claims has been amended as in the attached written amendment to clarify the mode of connection between the output terminals of the data-side integrated circuit and the thin-film transistors disposed on the pictogram display area.

With this, the suggestion in which "the structure corresponding to the "extra output terminal" in claims 1 and 6 is not described in Description. Also, the meaning of that term and the relationship with the other components are unclear" has been resolved.

(6) As has been described above, we believe that novelty and inventive step have been ensured for claims 1 to 12 in Claims as amended. Therefore, please provide us with your remark that all of novelty, inventive step, and industrial applicability are ensured for the claims of the present application as amended.

entire surface of the common substrate 35. This common electrode 32 is divided into the pictogram display area 33 and the moving image display area 34. The pictogram display area 33 is for displaying a fixed still image, such as a pictogram that will be described further below, and the moving image display area 34 is for displaying moving images, an unfixed still image, or the like.

The resolution of the moving image display area 34 of the liquid crystal display device 15, that is, the number of display pixels provided on the element substrate 8, is 237 per row (horizontal direction) and 120 per column (vertical direction) in the present example. Also, the liquid crystal display device 15 according to the present example is a reflective liquid crystal display device in a light-reflecting (normally white) mode when no voltage is applied to the display pixel electrodes.

The FPC 31 and the PCB 18 are connected to each other by a crimp connector (not shown). The FPC 31 and the element substrate 8 are bonded through thermocompression by an anisotropic conductive sheet (ACS). Dotted lines shown on the FPC 31 represent wiring provided on the back side (back side of the page) of the FPC 31.

The FPC 31 has a function of supplying a signal generated by the control circuit 16, which is a signal generating circuit provided on the PCB 18, and power generated by the power supply circuit 17 to the data-side integrated circuit 26 and the scan-side integrated circuit 27, and inputting outputs from the data-side integrated circuit 26 and the scan-side integrated circuit 27 to TFTs 29 provided on the element substrate 8.

incorporated in the portable device 10 according to the example of the present invention shown in Figs. 1A and 1B. The liquid crystal display device 1015 according to a fourth mode has a structure in which, in the pictogram display area 33, the first pictogram electrode 23 for displaying a first pictogram is driven by a first pictogram thin-film transistor (TFT) 51, while the second pictogram electrode 24 for displaying a second pictogram is driven by a second pictogram thin-film transistor (TFT) 52. Other than that, the structure of the liquid crystal display device 1015 is identical to that of the liquid crystal display device 15 (refer to Fig. 2) according to the first to third modes. Therefore, components identical to those of the liquid crystal display device 15 shown in Fig. 2 are provided with the same reference numerals, and are not described herein for avoiding redundancy.

The first pictogram TFT 51 is provided on the element board 8. The source terminal of the first pictogram TFT 51 is connected to the signal line 19. This signal line 19 is a line other than the moving image data line 6 provided to the data-side integrated circuit 26, and is connected to an electrode made of chromium (Cr) metal additionally provided to the data-side integrated circuit 26. The drain terminal of the first pictogram TFT 51 is connected to the first pictogram electrode 23. The gate terminal of the first pictogram TFT 51 is connected to any one, not particularly restricted, of 120 scan lines 7 connected to the scan-side integrated circuit 27, for example, in the example shown in Fig. 10, a scan line 7 on the first row, together with the gate terminals of the 237 TFTs 29 arranged on the first row of the moving image

display area 34.

The second pictogram TFT 52 is provided on the element board 8. The source terminal of the second pictogram TFT 52 is connected to the signal line 20. This signal line 20 is a line other than the moving image data line 6 provided to the data-side integrated circuit 26, and is connected to an electrode made of chromium (Cr) metal additionally provided to the data-side integrated circuit 26. In the fourth mode, the first pictogram TFT 51 and the second pictogram TFT 52 are connected to different electrodes in the data-side integrated circuit 26. The drain terminal of the second pictogram TFT 52 is connected to the second pictogram electrode 24. The gate terminal of the second pictogram TFT 52 is connected to the same scan line 7 to which the gate terminal of the first pictogram TFT 51 is connected, that is, in the example shown in Fig. 10, the scan line 7 on the first row.

Therefore, the FPC 31 performs a function of inputting outputs from the data-side integrated circuit 26 and the scan-side integrated circuit 27 not only to the TFTs 29 in the moving image display area 34, but also to the first pictogram TFT 51 and the second pictogram TFT 52 in the pictogram display area 33. Pixels of the first pictogram 21 include the first pictogram TFT 51, the first pictogram electrode 23 connected to the first pictogram TFT 51, the common electrode 32 opposed to the first pictogram electrode 23, and the liquid crystal 36 sandwiched between the first pictogram electrode 23 and the common electrode 32. Also, the pixels of the second pictogram 22 include the second pictogram TFT 52, the second pictogram electrode 24

CLAIMS

1. A liquid crystal display device capable of displaying a moving image display area for displaying moving images and a pictogram display area, wherein the moving image display area is formed by arranging display electrodes in a matrix, the display electrode being driven by thin-film transistor elements, and the pictogram display area is formed by disposing a segment electrode in a shape of a predetermined pictogram, wherein

a common electrode is provided at a position that is opposed to both the moving image display area and the pictogram display area,

a scan-side integrated circuit for driving scan lines is provided so as to be connected to the scan lines connected to the thin-film transistors arranged in a row direction in the moving image display area,

a data-side integrated circuit for driving data lines is provided so as to be connected to the data lines connected to the thin-film transistors arranged in a column direction in the moving image display area, and the data-side integrated circuit is provided with a larger number of output terminals than the data lines, and

the segment electrode is connected to an extra output terminal of the data-side integrated circuit, and a difference between a potential of the common electrode and a potential of an output signal from the data-side integrated circuit is used to display the pictogram in the pictogram display area.

2. The liquid crystal display device according to claim 1, wherein an output signal from the data-side integrated circuit to the segment electrode is generated so that an output potential is varied for each predetermined period.

3. The liquid crystal display device according to claim 2, wherein the output potential varied for each predetermined period is made within a voltage range of the potential of the common electrode, thereby suppressing a direct-current component caused by a difference between the potential of the data output signal and the potential of the common electrode.

4. The liquid crystal display device according to claim 2, wherein the predetermined period is a period required for inverting a polarity of the common electrode.

5. The liquid crystal display device according to claim 3, wherein the output potential varied for each predetermined period is controlled by an input signal defining a gray tone to the data-side integrated circuit.

6. A liquid crystal display device capable of displaying a moving image display area for displaying moving images and a pictogram display area, wherein the moving image display area is formed by arranging display electrodes in a matrix, the display electrodes being

driven by moving-image thin-film transistor elements, and the pictogram display area is formed by disposing a pictogram electrode in a shape of a predetermined pictogram, the pictogram electrode being driven by a pictogram thin-film transistor element, wherein

a common electrode is provided at a position that is opposed to the moving image display area and the pictogram display area,

a scan-side integrated circuit for driving scan lines is provided so as to be connected to the scan lines connected to the moving-image thin-film transistors arranged in a row direction in the moving image display area,

a data-side integrated circuit for driving data lines is provided so as to be connected to the data lines connected to the moving-image thin-film transistors arranged in a column direction in the moving image display area, and

either one of a source terminal or a drain terminal of the pictogram thin-film transistor is connected to, among a plurality of output terminals of the data-side integrated circuit, an output terminal that is different from output terminals to which the data lines connected to the moving-image thin-film transistors are connected, and other terminal of the pictogram thin-film transistor is connected to the pictogram electrode, other terminal of the pictogram thin-film transistor is connected to an output terminal of the scan-side integrated circuit, and a difference between a potential of the common electrode and a potential of the drain terminal of the pictogram thin-film transistor is used to display the pictogram in the pictogram display area.

7. The liquid crystal display device according to claim 6, wherein the pictogram display area is provided with a plurality of the pictogram electrodes and a plurality of the pictogram thin-film transistors, and gate terminals of the pictogram thin-film transistors are connected to a same output terminal of the scan-side integrated circuit.

8. The liquid crystal display device according to claim 6, wherein the pictogram display area is provided with a plurality of the pictogram electrodes and a plurality of the pictogram thin-film transistors, and gate terminals of the plurality of pictogram thin-film transistors are connected to different output terminals of the scan-side integrated circuit.

9. The liquid crystal display device according to claim 6, wherein one pictogram electrode has connected thereto a plurality of the pictogram thin-film transistors.

10. The liquid crystal display device according to claim 9, wherein gate terminals of a plurality of the pictogram thin-film transistors connected to a same pictogram electrode are connected to different output terminals of the scan-side integrated circuit.

11. The liquid crystal display device according to claim 6, wherein a gate terminal of the pictogram thin-film transistor is connected

to, among a plurality of output terminals of the scan-side integrated circuit, an output terminal that is different from output terminals to which scan lines connected to the moving image thin-film transistor are connected.

12. The liquid crystal display device according to claim 6, wherein the pictogram display area is provided with the plurality of the pictogram electrodes and the plurality of the pictogram thin-film transistors, and source terminals of the plurality of the pictogram thin-film transistors are connected to a same output terminal of the data-side integrated circuit, and other terminals of the plurality of pictogram thin-film transistors are connected to different output terminals of the scan-side integrated circuit.